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ANNUAL REPORT

OF THE

PRESIDENT OF THE BOARD OF REGENTS

OF THE

STATE AGRICULTURAL COLLEGE

TO THE

GOVERNOR OF OREGON.

Legislative Assembly, Eighteenth Regular Session.

1895.

PUBLISHED BY AUTHORITY.

SALEM, OREGON:
FRANK C. BAKER, STATE PRINTER
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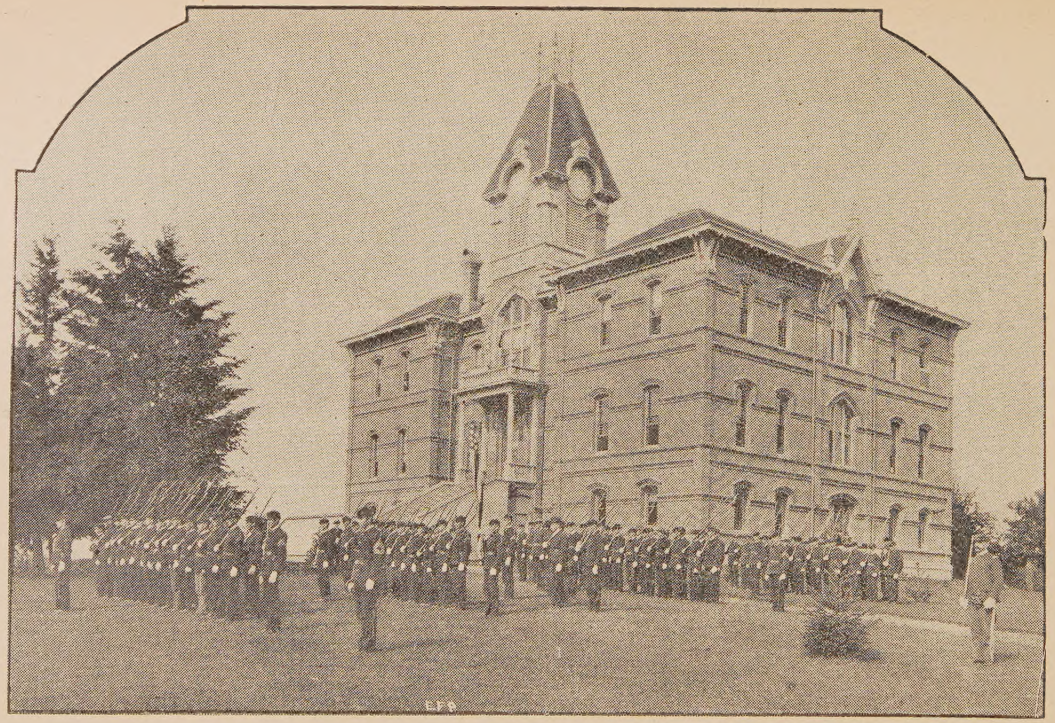

State Agricultural College, Corvallis.

6

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To His Excellency, Sylvester Pennoyer, Governor of Oregon:—

SIR: I have the honor to forward to you the following report from the president of the board of regents of the State Agricultural College of Oregon.

Very respectfully, WALLIS NASH, Secretary.

CORVALLIS, Oregon, January 7, 1895.

REPORT.

To His Excellency, Sylvester Pennoyer, Governor of Oregon:—

SIR: In accordance with the law of 1885, under which the reorganization of the State Agricultural College of Oregon was carried into effect, it becomes the duty of the president of the board of regents to submit a report of the operations of the college, and also of the experiment station connected therewith, for the year commencing July 1, 1893, and ending June 30, 1894.

With this report is also furnished a report of the receipts and disbursements of the college account for the same period, which has been examined and approved by the special committee of the board of regents. A copy of their report is also sent.

When a similar report to the present was last addressed to the governor of Oregon it was signed by W. S. Ladd. He was the then president of the board, and had filled that same position since the first meeting of the board acting for and under the direct authority of the State. The death of Mr. Ladd was a great loss to the State Agricultural College, since his interest in its operations was real, zealous, and self-sacrificing, and it was a sincere grief to his colleagues on the board, who still miss his genial presence and wise counsel.

In July, 1893, the college was deprived by death of the services of Mr. A. R. Shipley, the treasurer, who had succeeded the late T. E. Cauthorn in that office. To his memory it is right also to bear testimony as one who gave his best services to the college, and perseveringly and earnestly discharged his duties even while the hand of disease was pressing hardly on him.

On the death of Mr. Shipley, Dr. J. M. Applewhite was appointed a regent, and as one of the resident members of the board, was elected to fill the office of treasurer. On his death, in May, 1894, the Hon. J. K. Weatherford was, by the unanimous vote of his colleagues, elected treasurer. After duly qualifying he has promptly entered on the discharge of his duties.

When the last printed report to the governor was rendered John M. Bloss had but recently been appointed president of the college

and director of the experiment station. It was then too early to speak confidently of the success of his management and control of the institution, although the board was then already well satisfied that the selection of President Bloss had been a wise one. The experience of the last two years has continued to justify the appointment of President Bloss.

The board believe and are satisfied that the college has been well, prudently, and energetically managed throughout its many and various departments. They are satisfied, also, that the experiment station is fulfiling its functions to the benefit of the citizens of Oregon. A more extended account of that branch of the institution will be found in the report specially devoted to it.

Prior to the commencement of the last college year the board determined to limit the entrance to the preparatory department to those students who, from their place and conditions of previous education, had not been in a position to avail themselves of the advantages of graded schools. It appeared to be desirable, on the one hand, to keep the doors of the college open to those who had been deprived of the previous training of the graded school, but who, living far from cities, had yet made the best use they could of the country school with its short terms, mingled classes, and single teacher. On the other hand, it was certainly right to raise the standard of admission to the college for such students as either had, or should have passed through, and graduated from the graded schools of the larger towns and cities of the State.

The board of regents desired that the State Agricultural College should attract and invite the selected, industrious, and successful pupils of the graded schools throughout the State. The course of such students, in those schools, had demonstrated both their demand for and their appreciation of the higher education provided by the bounty of the nation and the wisdom of congress in the colleges maintained by the nation in every State, for wider, higher, and more thorough training in "agriculture and the mechanic arts, not omitting the usual branches of a liberal education."

Therefore the board of regents declined to admit into the preparatory department pupils from towns and cities of fifteen hundred population; but they maintained that department for the special benefit of the farmers' sons and daughters, whose *alma mater* had been the little schoolhouse by the cross-roads.

While the numbers of the students have not suffered any material diminution from the adoption of this rule, there is no question that the general average of the students, both in age, literary standing, and general demeanor, has been perceptibly elevated.

It has been the aim of President Bloss (and in this he has had

he cordial support of the board of regents,) to raise the standard of nstruction in the English language and literature, and in the arts f composition and expression. He has succeeded in stimulating he interest of both professors and students in these departments, as as been evidenced by the public work of the students in the liter- ry contests for the possession of the gold and silver medals pre- ented by President Bloss as meeds and tokens of their success.

But this advantage has not been gained by the surrender of any f the branches of technical and scientific work which are the pecial aim of the State Agricultural College. On the contrary, here is abundant proof that the faculty have been both zealous nd successful in their various and multiform departments. The oard are conscious that the time of both professors and students is nly too fully occupied in the many and diverse lines of study in he courses as now arranged. They feel that while the limit of hree years is set for so many of the students, (as must apparently e the case while the study time of the average Oregon young man nd woman is kept within its lines by the pressure of the necessi- es of daily life,) any changes in the studies taught should be ather in the deepening of the amount of study given to any branch han by adding more departments to a three years' course already verfilled.

The report of President Bloss, accompanying this report, will eal in greater precision and fullness with the college work. It re- ains to add that the legislature of 1893 generously appropriated sum of $26,000 for the new buildings, equipment, and outfit de- anded by the growth of the college and station work. Of this mount, $11,500 has been expended by the board in the four de- artments of agriculture, horticulture, mechanical arts, and pho- ography, by the erection of the new buildings required. The sum f $3,776.99 is available for equipment during the year 1894–5. he balance of the fund is unfortunately in litigation at this time, owing to its having been deposited in the bank of Hamilton, Job Co., which failed in June, 1893) and the outcome cannot, at the me of preparing this report, be predicted with any certainty. The oard, it may suffice here to say, are using every effort to secure he college against ultimate loss on this account. They have, eanwhile, limited their expenditure within the amount of avail- ble funds, a course which they will continue to follow.

It is a matter of much satisfaction to the board, and they think hat the citizens of Oregon are to be congratulated on the fact, that he hard times, and consequent straightened circumstances of so any, have not had more effect in keeping worthy and energetic tudents out of the State Agricultural College. The maintaining

of the large number of students during the year 1893–4 is a most satisfactory token of the appreciation throughout the State of the kind and quality of the education provided here. Every effort will be made to continue to disseminate through all classes and in all localities in Oregon the advantages of technical education, pursued under the specially trained professors and instructors, and with the aid of the costly and varied equipment of the State Agricultural College.

In the spring of this year the general government responded to the request of the board for an instructor in military science and tactics demanded by the law, and Lieutenant Dentler was accordingly detailed for this purpose. The male students have, therefore, had during the past three months the advantage of military drill and discipline, and have, as reported by Lieutenant Dentler, made good progress in this department also.

During the year now closing, the holding of farmers' institutes in various parts of the state, by and under the auspices of the Agricultural College, has been pursued with regularity and diligence. The meetings have been of a very practical kind. The professors chosen to attend have been selected with an eye to the nature of the farming, stock-raising, or horticultural industries followed in the special localities. Their presence has always been welcomed, and the variety of questions put to them and the discussions which have followed their answers, have showed the appreciation of the audiences.

During the year past, the college has been visited by a largely increased number of persons interested in the work there carried on. The variety of the pursuits and studies of the students, the nature and value of the outfit and equipment of the several departments, are matters of invariable remark. The board trust that many more of those interested in advanced and technical education, as applied to the farm, the orchard, the workshop, and mechanical pursuits generally, will come and see for themselves the developments of the system now in full operation at the State Agricultural College.

For the board of regents.

WALLIS NASH, Secretary.

CORVALLIS, December 1, 1894.

REPORT

OF

THE PRESIDENT OF THE STATE AGRICULTURAL COLLEGE

AND

Director of the State Experiment Station.

Governor Sylvester Pennoyer, President of Board of Regents, Oregon Agricultural College:—

Dear Sir: I herewith transmit to you, and through you to the board of regents, the report of work of the State Agricultural College for the past two years. I entered upon my work as president of this institution June 1, 1892, and it became my duty to make the biennial report for the preceding two years at the close of that month.

In that report the purposes of the State Agricultural College were set forth, and it was shown that the school was in alignment with the intention of its originators.

During the past two years my attention has many times been called to the fact that the purpose of the school and its field of work are not yet well understood by the people. The name, Agricultural College, is to many misleading; therefore those who have no other means of knowing what the institution is, except through its name, assume that it is a place where young men are taught that which they are already supposed to know—how to plow, to reap, and to sow. Many intelligent persons who visited the school within the past two years have expressed their surprise at the breadth of culture here given, and have admitted that the name had misled them as to the purposes of the school. They were not aware that it is as truly a mechanical and economic school, as it is an agricultural and horticultural school.

The work of this college can be best discussed under two general heads, viz., the Literary, and the Technical work.

LITERARY WORK.

The literary work of this school may be divided, for convenience of discussion, into two general heads—first, that in which the

primary object is to give culture and to prepare the student for good citizenship; and secondly, that which underlies and is preparatory to the technical education which he has chosen.

CULTURE STUDIES.

While it is true that all branches studied result in culture, it is equally true that those branches whose primary object ends in culture are of great importance in preparing the student for his work in agriculture, horticulture, household economy, and mechanics. Thus, much stress is placed upon English, not only as the necessary basis of all education here, but also because it is the key which unlocks the treasure-house of knowledge to the American student. A knowledge of grammar, rhetoric, and logic, etc., for themselves is comparatively valueless. It is true that mental growth may be attained through the study of these, as well as of other sciences, but through these there is more to be gained than simply mental discipline. These are practical subjects, and to be of use to the student, the laboratory process must be applied, just as is done in chemistry. Hence the study of the use and power of words by means of works on synonyms, and through practice in composition, receive attention in the classroom. To further develop the student, regular literary work, under the direction of the whole faculty, is carried on weekly in the literary societies. Monday afternoon of each week is devoted to this work. These exercises consist of essays, debates, recitations, and select readings. This work is so arranged that each student comes on duty every other week.

This, while it lays some additional burden on the members of the faculty, gives ample return in the added power gained in mastering the technical work of the school.

But there is an additional reason for the study of English. Knowledge is said to be power; but it is not available power to the world unless its possessor can give it expression.

In the classroom, the study of the history of the language, — its growth and development — the study of the great writers in prose and fiction, — all tend to cultivate and prepare the student not only for an appreciation of good literature, but for a better means of expressing thought.

Under this division may be placed history — modern, mediæval, and ancient — as well as political economy, psychology, and ethics. The value of these studies is so apparent that they need no discussion.

No foreign language, except Latin, is embraced in the curricu-

lum, and this is optional except to those who desire to take the degree of Bachelor of Science, or Bachelor of Letters.

SUBJECTS UNDERLYING THE TECHNICAL WORK.

There are many subjects in every curriculum which in themselves may seem unnecessary, yet a little investigation will show to be essential, because they underlie the technical knowledge which the student most desires.

Thus arithmetic, algebra, geometry, and calculus, etc., each in turn becomes essential to some work of the college, viz.: Arithmetic to bookkeeping; algebra to the higher phases of geometry, chemistry, and philosophy; geometry and trigonometry to surveying and civil engineering; calculus to the applications of mechanics and mechanical engineering.

Free-hand drawing is not only a culture study, developing the æsthetic nature, but is invaluable for cultivating the power of observation, so essential in all technical work. Drawing itself is a form of expression and becomes a means of illustration in all the sciences. Chemistry, geology, botany, and zoölogy in their elementary forms bring us face to face with Nature's laws and in this sense become culture studies, as well as foundation for the technical work.

TECHNICAL STUDIES.

There are three general courses,—the agricultural, the mechanical, and that of the household economy; and a line of study is adapted to each. All these look forward to the preparation of the student for some business industry.

The agriculturist must have a special knowledge of the science of chemistry and be able to make both qualitative and quantitive analyses. This involves analysis of soils, as well as determining the food values of grains and grasses.

This line of work, it will be observed, leads to a special field — agricultural chemistry. But chemistry underlies, to a great extent the science of geology and mineralogy and thus is the means of opening another special field — metalurgy.

What could be more important to the citizens of Oregon than thus to lay bare its mountain wealth, and to discover and adapt to its rich valleys new food plants?

Zoölogy leading up through comparative anatomy, and physiology, precedes and forms the basis for the study of veterinary science, entomology, and ornithology. These are, alike, subjects invaluable to the agriculturist and horticulturist.

Entomology itself has become a special field for investigation and rich finds are yet to be made along this line.

To these must be added a scientific and practical knowledge of drainage, methods of preparing the soil for the crop, the study of the history of the breeds of stock, methods of feeding, the preparations of foods, and the study of food values, the silo and the preparations of silage, each of which is a most valuable subject for discussion and investigation.

But in addition to this the student of agriculture must have prosecuted his study of botany far beyond its elementary form. Structural botany, plant physiology, the hygiene of plant life, are each subjects in which both agriculturist and the horticulturist are intensely interested. The diseases which attack plants again open up new fields which can only be studied under the microscope —hence microscopy, a field of work in itself, must be mastered. The study of fungous diseases and their remedies—the effect of climatic conditions on vegetable growth—are each subjects for consideration in economic botany. Entomology here touches upon the science of botany, since it is necessary to know what insecticides will destroy the insect and not injure the plant.

Horticulture, as is well understood, is but a subdivision of agriculture; hence the agricultural student must have studied horticulture as a science and an art before he is prepared to graduate. He must understand grafting, layering, and budding. He must understand the best means of cultivating roots, fruits, and flowers. Here is opened up a wide field in which every citizen in Oregon is interested. There is a philosophy here to be taught which is invaluable. New flowers, fruits, and vegetables are each year invented, or introduced, and from the old-fashioned plants, fruits, flowers, and grains, newer and better varieties are each year developed. In the past these were secured by accident. But cross-fertilization is a most important subject in all departments of agriculture. The student in agriculture in this school must become acquainted with all these subjects. In addition to this he works three months the first year in the carpenter shop, and three months the second year in the blacksmith shop, so becoming acquainted with the tools he must use on the farm.

Those who complete the household economy course have all the literary work of those who complete the course in agriculture, and, in addition, horticulture and floriculture, and many of the phases of landscape gardening. But their distinctive industrial work includes sewing, millinery, cooking, the chemistry of cooking; in fact, all that goes to make up the art and science of household economy.

In this department, too, they receive a special course of instruction in the study of their own organisms, — how to secure health, and to maintain it. I know of no work which is more important; it covers a wide field.

The mechanical student completes all the literary work of the school, and all those branches which underlie the mechanical work of the special department.

Having completed his work in free-hand drawing, he is now prepared to enter upon the work of mechanical drawing, which, later on, is the basis for his work in architectural drawing. His industrial work for the first year is in wood, which is all wrought from prepared designs. His industrial work for the second year is in the blacksmith's shop. Here he not only designs, but fashions his work in accordance with the plans prepared.

His third year's industrial work is in the machine shop, where he learns how to fashion iron, cast or wrought, into useful forms. The science of mechanics is the basis for all his work. The science of the machine, and the strength of materials, are each involved. His fourth year involves the application of calculus to the determination of forms, to the strength of materials, and to the application of forces which give the best result. The steam engine and the dynamo must be mastered in both theory and practice. His industrial work consists in the manufacture of a complete machine, including making the design, preparing the patterns for casting, and the work necessary to its complete adjustment and fitting up in the machine shop. The machine manufactured last year was a dynamo which was to operate eight sixteen-candle power incandescent lights. This year the students have made a five-horse power engine.

The above is an outline of the work which has been carried on in each of the past two years. Industrial work of one hour each day is required of each student. Although this work is not, as a rule, profitable as an investment to the institution, yet it is of great value to the student. It is practically the laboratory work in those technical sciences in which the student is engaged.

The requirement of laboratory work in all the scientific branches during the last two years has been extended.

In chemistry, physics, physiology, zoölogy, entomology, and botany, laboratory work of two hours is required each other day. In this respect we are keeping abreast with the best scientific institutions in the United States.

The work above indicated in each of the departments has been pushed forward with commendable earnestness. The success has been the greater because of the harmonious and enthusiastic work of each member of the faculty.

MILITARY SCIENCE AND TACTICS.

Instruction in military science and tactics, as you are aware, is required in all land grant colleges. This work for the first year and a half covered by this report was under the charge of one of our professors. During the last half of the present year this work has been under the direction of a United States army officer, detailed by the general government for that purpose. The energy which he has displayed and the work accomplished are very commendable.

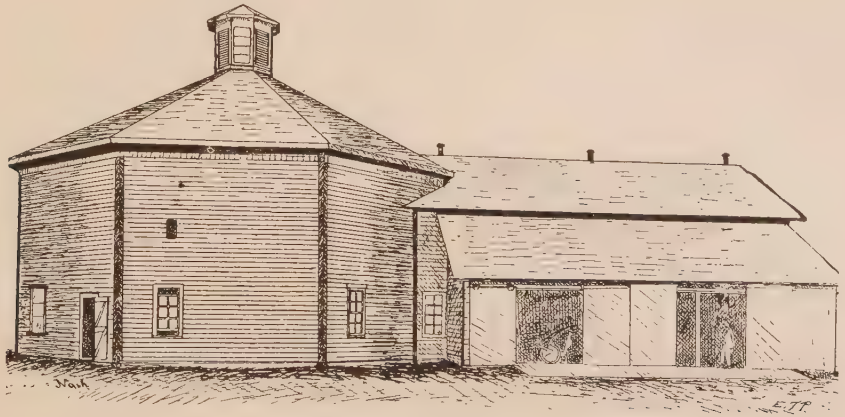
Here it would be proper to state that the climate of Oregon is such that many days during the regular school year are unfitted for military drill in the open air. During the past winter and spring months it has been necessary to have the military exercises in halls and unoccupied rooms. These are comparatively small and not fitted for the purpose. I would suggest that at an early day a building suitable for an armory and gymnasium be erected. It should be so arranged that it could be converted into a large hall, where our graduating exercises could be held.

I would further suggest that the board make application for 200 stand of arms from the government, and also for two pieces of artillery. The arms that we now have are not sufficient to equip the students in attendance. The drill in artillery would not only be useful in itself but be equally valuable as a means of discipline.

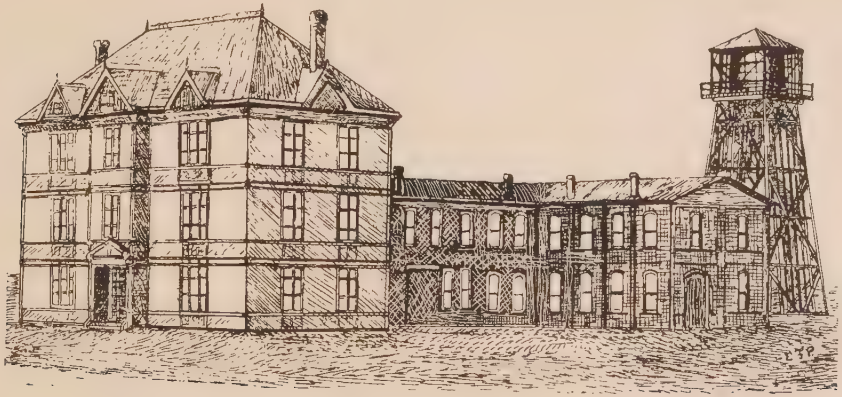
FARMERS' SHORT COURSE.

This course was organized during the past year for the purpose of offering to the practical agriculturist and horticulturist, and to those interested in such work, a course of instruction which would assist them in their vocations.

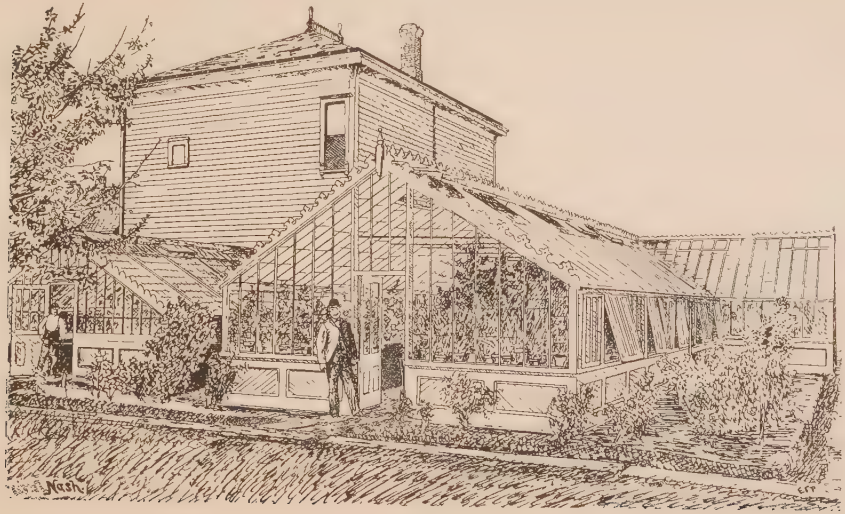
This being the first attempt of the kind in the West, and the purposes not being well understood, it has happened that (as was expected) the number enrolled was small. The enthusiasm, however, of those who entered on the work was none the less for the smallness in numbers. The number enrolled was fifteen. The course consisted of eighty lectures, embracing botany, chemistry, etomology, agriculture and horticulture, poultry-raising, drainage, etc.; and, in addition to this, laboratory work in the various departments. The course began January 10, 1894, and closed February 7, 1894, comprising twenty working days. In this course no educational requirements for entrance were made; all practical farmers or horticulturists were admitted. No fee for tuition was charged. The work accomplished was valuable. The work will be continued during the coming year, and it is hoped that a larger number of



Barn with Addition.



New Mechanical Hall.



Horticultural Hall.

men and women will undertake it. I know of no way in which the State Agricultural College can in the same length of time do more for the people of Oregon.

IMPROVEMENTS.

The appropriation of $26,100 made by the last legislature has been partially expended. All the buildings proposed at that time have been erected in accordance with the plans proposed, and many of the other improvements made. All that was proposed would have been done but for the closing of the bank which involved the locking up a part of the fund. The release of at any rate a large percentage may, it is hoped, be secured before very long.

The work done, briefly stated, is as follows:—

First—An addition has been made to the barn, 32 x 60 feet, two stories in height, and a shed 14 x 60 feet. This building was fitted with floors and stalls for cattle. The building also includes two silos, with a capacity of sixty tons each.

Second—An addition has been made to the mechanical building 80 x 38 feet, three stories in height, and with a wing connecting it with the old building 40 x 32 feet, and two stories in height. This building has been completed in all respects, but the machinery, which it was intended to add, has not all been purchased, although enough has been put in to meet the pressing needs of this department.

Third—A horticultural building, two stories in height, 30 x 40 feet, has been erected, and a greenhouse, 20 x 50 feet, has been added. This building has been completed. A new furnace, with piping for heating, was put in place in the fall of 1894, and has since been in successful operation. This gives our greenhouses an area of 2,500 square feet of floor surface. The second story of the horticultural building has been fitted for the photograghic department. The first floor has been fitted for a classroom for instruction in horticulture and floriculture, etc. The basement is occupied by the fuel and heating apparatus.

Fourth—A storehouse, 20 x 30 feet, one story in height, has been erected for the dormitory. This was necessary in order to preserve fruits and vegetables.

Fifth—New furnaces have been placed in the college building.

Sixth—About 2,000 feet of drain tile has been laid in pursuance of the plan for the drainage of the college grounds.

Besides the above, some minor matters in repairs of buildings, and in the adjustment of the grounds and the walks, have been accomplished.

ATTENDANCE.

The attendance, although the times have been hard, has been excellent, as will be shown by the following tabulated statement:—

Year.	Preparatory.	First.	Second.	Third.	Fourth.	Post graduate.	Total.
1888-89	36	33	14	14	0	0	99
1889-90	67	55	17	6	0	6	151
1890-91	76	83	24	15	0	3	201
1891-92	86	63	28	19	9	3	208
1892-93	98	123	31	18	7	5	282
1893-94	36	103	71	21	5	4	240

The above shows that this year there have been sixty-two less enrolled in the preparatory department than during the previous year, and that forty more have been enrolled in the second year, and it will be seen also that there are twenty-two more in the college department than during the preceding year. This increase, under the financial stress, is a matter of congratulation. The small enrollment in the preparatory department is due to the fact that the board have excluded from that department all pupils from cities containing fifteen hundred inhabitants. This rule has proved very beneficial.

PRINTING.

For the past two years students have been admitted to a course in printing. The work is optional and does not relieve the student from work in any other course. This course prepares the student for a vocation, and is a means of culture as well. It furnishes excellent help to the study of English. There have been eight students in this department during each of the last two years. The printing office is a necessity for the work of the college. Here the catalogues, bulletins, circulars, programmes, blanks, etc., are printed. The editions of the bulletins for the past year have varied from 5,500 to 6,000. The estimated value of the work done in the printing department for the past two years is a follows: July 1, 1892, to January 30, 1893, value of printing, $1,876; July 1, 1893, to January 30, 1894, value of printing, $1,950. Besides furnishing a means of education for a number of students, this department has during each of these years proved a valuable investment for the college.

REPORT OF THE TREASURER.

To His Excellency, Sylvester Pennoyer, Governor of Oregon:—

SIR: We, the undersigned, being the special committee of the board of regents of the State Agricultural College, to whom was entrusted the duty of examining and reporting on the accounts of the treasurer, beg to report as follows:—

We have attended at the college and there examined the summary of receipts and expenditures on college account submitted by the present treasurer, Hon. J. K. Weatherford, but being in the main the result and summary of the accounts kept under the direction of the late treasurer, Dr. J. M. Applewhite, who died in May last. The books have been kept, and the accounts and vouchers, also, by the clerk of the board, Mr. H. R. Clarke, who has submitted the same to us with all needful explanations. We find the vouchers to correspond with the books. We report that the summary hereto attached correctly shows the receipts and disbursements on the college account, both of current income and also on the improvement fund account between the first day of July, 1893, and this day, the twenty-seventh day of June, 1894.

Very respectfully,

E. B. MCELROY,
J. VOORHIES,
J. T. APPERSON,
Committee.

RECEIPTS AND EXPENDITURES.

The summary of receipts and expenditures were as follows.

COLLEGE ACCOUNT.

Income of college, July 1, 1893, to June 30, 1894.

RECEIPTS.		Amount.
Interest from land grant		$ 9,204 42
United States government		19,000 00
Farm and gardens	$748 20	862 25
Miscellaneous	114 05	
Tuition		1,892 50
		$ 30,959 17

DISBURSEMENTS.

	Amount.
Advertising and printing	$ 110 95
Current expenses	1,153 05
Freight, express, and drayage	116 60
Household economy	413 24
Institute	83 15
Library	81 60
Labor	873 05
Mechanical department	890 61
Machinery and tools	61 43
Miscellaneous (including subscription to association)	160 65
Repairs to heating apparatus	140 79
Postage, stationery, and telegrams	141 17
Printing department	862 83
Repairs and betterments	123 35
Traveling expenses	537 30
Salaries	21,915 05
Sanitary	483 10
Supplies	538 65
Scientific instruments	13 95
Wood for fuel	2,052 65
Meteorology	206 00
	$ 30,959 17

SUMMARY.

The summary of the improvement fund for the same period.

	Amount.
RECEIPTS.	
From the State of Oregon	$ 16,363 84
EXPENDITURES.	
By vouchers returned	12,586 85
Bank collections available	$ 3,776 99

REPORT OF THE EXPERIMENT STATION.

REPORT.

CORVALLIS, Oregon, January 7, 1895.

To His Excellency, Sylvester Pennoyer, Governor of Oregon:—

SIR: Under the provisions of section 5 of the act of congress, usually known as the "Hatch Experiment Station Act," we beg to submit to you the report of the operations of the Oregon Experiment Station for the years commencing July 1, 1893, and July 1, 1894, and also a report of the receipts and expenditures on station account during the financial year expiring the thirtieth day of June, 1894.

Very respectfully,

WALLIS NASH,
Secretary of the Board of Regents.

AGRICULTURAL EXPERIMENT STATION.

Report of the Special Committee of the Board of Regents at the annual meeting, held at Corvallis on Wednesday, June 27, 1894.

To His Excellency, Sylvester Pennoyer, Governor of Oregon —

SIR: We, the special committee appointed by the board of regents of the State Agricultural College, controlling the Hatch Agricultural Experiment Station connected with such college, to whom was referred the duty of examining and reporting on the accounts of the treasurer of such experiment station, and on the receipts and disbursements of the income of such station, beg leave to report: We have examined the accounts of the treasurer of such station and the vouchers presented by him. We have found such vouchers submitted to correspond with such books. We have examined also the summary of receipts and disbursements submitted by the treasurer, and which is attached hereto, and we find that such summary correctly shows the results of the operation of such experiment station for the financial year between the first day of July, 1893, and

this twenty-seventh day of June, 1894, and to the thirtieth of June 1894.

Very respectfully,

E. B. McELROY,
J. VOORHEES,
J. T. APPERSON,
Committee.

RECEIPTS AND EXPENDITURES.

Summaries of receipts and expenditures on Experiment Station account, July 1, 1893, to June 30, 1894.

RECEIPTS.

By cash from United States government	$ 1,500 00

DISBURSEMENTS.

Bulletins	543 51
Botany supplies, etc.	208 30
Chemistry supplies	544 48
General supplies	327 44
Scientific instruments	51 65
Postage, stationery, and telegrams	73 25
Freight, expressage, and drayage	49 45
Fencing and drainage	186 50
Feed for stock	210 07
Greenhouse, repairs to heaters, pipes, etc.	350 00
Incidentals	193 15
Library	86 91
Labor	3,554 57
Miscellaneous	40 00
Livestock	229 00
Photography and photogravure	152 55
Repairs and betterments	250 50
Student labor on experiment grounds	130 00
Salaries	7,513 20
Tools and machinery	155 44
Traveling expenses	150 00
Total	$ 1,500 00

REPORT OF THE EXPERIMENT STATION.

Hon. Sylvester Pennoyer, President Board of Regents, Oregon State Agricultural College:—

DEAR SIR: The work of the experiment station is a field of labor which is but little understood by those who are not connected with it, or who have not given the matter any sufficient thought.

An experiment involves the solution of a preceding hypothesis. The solution may involve the labor and observation of a day, a month, a year, or several years. Important experiments usually demand much time. Thus the experiments in wheat—the most valuable for the climatic conditions of Oregon—may require five years. Experiments with potatoes, strawberries, cabbage, etc., would likewise require years of time. Experiments with insecticides and fungicides alike require patience and the specialized knowledge of trained experts. The same is true in stock feeding, experiments in the culture of fruit, etc.

Besides this it is often found that hypothesis are not true, and hence the work done, in many instances, only aids in forming a new hypothesis. Hence, it is not possible to make plain all the work of the station, but results only can be shown. Yet there is no more important work done by the government for the people than that accomplished through the various experiment stations. The introduction of one variety of wheat, as, for instance, that known as No. 10, will in one year more than repay the expense of the station for ten years. The experiments in pig feeding show that an Oregonian can produce pork as fine in quality, and about as cheaply as can be produced in the great corn belts. This alone ought to be worth millions of dollars to Oregon. A like statement may be made of many of the other experiments. From the above it will be seen that the work of the experiment station cannot be adequately described.

During the past two years, ending June, 1894, there have been twelve bulletins issued, of which a synopsis is appended to this report. Since the station has been organized there have been thirty-one bulletins issued from the various departments. The number of each bulletin issued during the past year is 5,500, but the demands indicate that a much larger issue must be made for the coming year.

Below will be found a list of the bulletins issued by this station.

A star is placed before those numbers the edition of which has not been exhausted: —

Bulletin No. 1, October, 1888; History and Organization, by E. Grimm, 11 pages.

Bulletin No. 2, January, 1889; Horticulture, by E. R. Lake, 27 pages.

Bulletin No. 3, October, 1889; Entomology and Chemistry, by F. L. Washburn, 26 pages (P. H. Irish, 21 figures).

Bulletin No. 4, January, 1890; Agriculture, Horticulture, and Chemistry, 35 pages, 1 figure.

Bulletin No. 5, April, 1890; Chemistry, by P. H. Irish; Entomology and Zoölogy, by F. L. Washburn, 31 pages, 13 figures.

*Bulletin No. 6, July, 1890; Chemistry, by P. H. Irish; Zoölogy, by F. L. Washburn, 16 pages.

*Bulletin No. 7, October, 1890; Small Fruits and Vegetables, by G. Coote, 12 pages.

*Bulletin No. 8, January, 1891; Varieties of Wheat and Flax, by H. T. French, 17 pages.

Bulletin No. 9, February, 1891; Silos and Silage, by H. T. French, 8 pages.

*Bulletin No. 10, April, 1891; Entomology, by F. L. Washburn, 34 pages.

Bulletin No. 11, May, 1891; Grasses and Potatoes, by H. T. French, 23 pages, 2 plates.

Bulletin No. 12, May, 1891; Strawberries, by G. Coote, 9 pages.

Bulletin No. 13, May, 1891; Chemistry, by G. W. Shaw, 8 pages.

Bulletin No. 14, May, 1891; Entomology, by F. L. Washburn, 14 pages, 4 figures.

Bulletin No. 15, January, 1892; Horticulture, by G. Coote, 16 pages.

Bulletin No. 16, February, 1892; Varieties of Wheat, by H. T. French, 9 pages, 1 plate.

Bulletin No. 17, February, 1892; Sugar Beets, by G. W. Shaw, 32 pages, 5 plates.

Bulletin No. 18, March, 1892; Entomology, by F. L. Washburn, 16 pages, 14 figures.

Bulletin No. 19, May, 1892; Oregon Weeds, by M. Craig, 48 pages, 19 plates.

Bulletin No. 20, September, 1892; Pig Feeding, by H. T. French. In this bulletin a report was made upon experiments in feeding three lots of pigs. The object of the work was to test the value of whole grain and ground grain fed separately, as compared with a mixture of the same kind of food. Lot 1 was fed ground oats and wheat, given to the pigs seperately; lot 2, whole oats and wheat, fed separately; lot 3, mixture of ground oats, wheat, barley, and shorts.

Cuts of meats were shown in connection with the notes. This bulletin contained 16 pages and 4 plates.

Bulletin No. 21, October, 1892; The Soils of Oregon, by G. W. Shaw. There is given in this bulletin a statement of opinion regarding the value of soil analysis; general information relating to soil formation and composition; and Hilgard's minimum hints of fertility for the various soil ingredients. There is also given an outline of the topography of the State, and comparative and tabulated analyses of twenty-eight characteristic Oregon soils, mostly from the Willamette Valley, together with the natural vegetable, and the physical, properties of each sample. This bulletin was intended to be the first of a series on the same subject, and no definite conclusions could be reached from so small a number of analyses; but, so far as the soils treated in this bulletin are concerned, there was a rather low percentage of potash for the valley soils, and a rather low percentage of phosphoric acid for the soils from Eastern Oregon. The edition of the bulletin is exhausted, but it has been reprinted in the biennial report of the Oregon Weather Bureau, and in the last annual report of the State Horticultural Society.

Bulletin No. 22, January, 1893; Horticultural Department, by George Coote. It contains comparative tests of small fruits and vegetables, with notes on the comparative value of different varieties; also, directions for pruning and renovating old orchards. This bulletin conveys the results of four years of experimental work.

Bulletin No. 23, February, 1893; Sugar Beets in Oregon, by G. W. Shaw. A continuation of the experiments begun in 1891 is described in this bulletin, which also embraces a résumé of the work done in that year. The bulletin contains comparative climatic tables showing the conditions under which the experiments were conducted. A summary of the analyses for 1892 shows an average for the State of 15.70 per cent sugar, with a purity of 78.08 per cent, against 13.75 per cent, and a purity of 77.57 per cent for 1891. Out of sixty-five samples analyzed in 1892, only eleven samples showed less than 12 per cent sugar, and forty-one gave over 14 per cent sugar, the extremes being 9.4 per cent and 23.80 per cent. Some of the conclusions reached are: First, good sugar beets can be produced in Oregon; second, they can be produced at a price which a factory can afford to pay; third, the yield compares favorably with that of other States now raising beets for the manufacture of sugar; fourth, large beets do not contain so large a percentage of sugar as small beets, and the purity is less; fifth, beets could be profitably substituted by the farmerfor bare fallow.

Bulletin No. 24, March, 1893; Potatoes and Roots, by H. T.

French. This bulletin contains a report upon the testing of fifty-nine varieties of potatoes as to yield, date of ripening, manner of growth, etc. Results of fertilizer tests upon potatoes are also given. Tests of thirteen varieties of carrots and eleven varieties of roots are reported in this bulletin. A short table is published in connection with this bulletin, showing composition of corn silage, and seven varieties of roots. The bulletin contains 12 pages.

Bulletin No. 25, April, 1893; by F. L. Washburn, gives a report on further work with the codlin moth and the hop-louse, and resulting recommendations to farmers and orchardists. The same bulletin contains a treatise on work done against gophers and moles; and various traps, guns, and other remedies were discussed, and some recommended. Bulletin contains 24 pages, 3 plates and 13 figures.

Bulletin No. 26, January, 1893; Drainage, by John M. Bloss, Director. 1. Necessity of drainage. 2. The purpose. 3. How water enters the tile. 4. The change effected in the character of the soil. 5. How to lay the tile; objectional methods: better methods; each represented by diagrams. 6. How deep. 7. How far apart. The edition of this bulletin is exhausted. It has been published in the report of the State Board of Horticulture for 1893, pages 225 to 236.

Bulletin No. 27, December, 1893: Botanical Department; Cause and Prevention of Plant Diseases, by Moses Craig, 31 pages. A popular account of common plant diseases, with the best means of prevention, illustrated by 23 figures; how to spray, apparatus needed, and mixtures used; when to spray; general hygenic treatment; special treatment of certain diseases, as scab, blight, rusts, and smuts, mildew, etc.

Bulletin No. 28, January, 1894; Continuation of Pig-feeding Experiments, by H. T. French. This bulletin contains the results of two experiments. Experiment No. 2 shows the results of feeding a single kind of grain as compared with a mixture. Four pigs were used in the experiment. Experiment No. 3 was conducted for the purpose of testing the results of wet food for pigs against dry food. There is a slight difference in favor of wet food. Half-tone cuts of the meat are shown in both cases. The bulletin contains 14 pages and 4 plates.

Bulletin No. 29, February, 1894; Horticultural Department, 50 pages, 6 figures, by George Coote. Notes on vegetables, fruits, and pruning. Notes on the comparative earliness and value of different varieties of cabbage, kale, celery, tomatoes, grapes, peaches, and strawberries; also directions for pruning the plum and prune. Bulletin contains 18 pages and 4 plates.

Bulletin No. 30, April, 1894; Potatoes and Roots, by H. T. French.

One hundred and fifty-three varieties of potatoes are reported upon in this bulletin. The yield per acre of eighty-eight varieties are given, also whether they are early, medium, or late. Fourteen varieties of mangells, three varieties of carrots, and three of rutabagas are also described. Cuts of thirteen varieties of carrots are presented in this report. Bulletin contained 10 pages, 2 plates, and 1 figure.

Bulletin No. 31, April, 1894; Report of Work in Entomological Department, by F. L. Washburn. Codlin Moth, Hop-louse, Flea Beatles, Cutworms, Wireworms, Radish Flies, and Tent Caterpillars. Illustrations of some Oregon insects and their work — Gophers and Moles. Outline of work with results and recommendations.

Article 2, Capons and Caponizing. Report on results of experiments made on caponizing cockerels, showing gain of capon over cockerel. The operation described, etc.

FARMERS' INSTITUTES.

The following institutes have been held during the past two years:—

At Milton, September 28–30, 1892; Newberg, Yamhill County, and Brownsville, Linn County, November 24–25, 1892; Dufur, Wasco County, February 24–25, 1893; Barlow, Clackamas County, February 24–25, 1893; Siuslaw, Lane County, May 19–20, 1893; Oakland, Douglas County, November —, 1893; Hillsboro, Washington County, November —, 1893; Corvallis, Benton County, January 10th and February 17, 1894. In addition to this, help has been given to horticultural meetings, county and State, whenever it has been possible. It has been the plan and purpose of the station council to hold an institute at any point where there was a desire for such a meeting, and where there was sufficient local interest to bring the agriculturists and horticulturists together.

RECOMMENDATIONS.

Besides improvements which have already been suggested, I feel that especial attention ought to be called to the necessity for a dairy. The last legislature was asked for an appropriation of $2,000 for this purpose, but it was omitted from the bill. This is a line of work — educative work — which should be directly connected with the college. Besides, it is a kind of work which should be sustaining.

The opinion that the student learns from, and is influenced only by, that "Course" which he pursues in the college, is far short of the truth. The mechanical student will make a better agriculturist and horticulturist because of his contact for four years with that

kind of work; the agricultural student is interested in the work of the mechanical student.

The same would be true of a dairy — every student attending the institution would get much of value to carry to his home, and to benefit him throughout life, although he may not have made that work a special study.

SYNOPSIS OF THE SPECIAL REPORTS.

From Professor H. T. French, Agriculturist to the Station: —

President John M. Bloss, Director of Experiment Station —

DEAR SIR: I herewith submit a brief report of work in the agricultural department of the station during the past two years.

During the year the time has been taken up in carrying on the experiments noted in the last biennial report.

First among the experiments, and one of the most important to the farmers, is that of feeding pigs, owing to the fact that wheat has been selling for such a low price that no profits could be realized from it, unless it could be converted into meat products. This experiment proved especially fortunate.

It will be observed in bulletin No. 28, that pork products can be profitably produced from feeding wheat, oats shorts, and bran; such products as can be grown in Oregon. The making of economical combinations of the food products of Oregon, is left for further investigation.

Much experimentation is needed along this line, that the best results may attend the work. It is quite as important to know how to feed as to know what to feed.

Much work is needed to determine the best methods of feeding cattle for market. The day of range-fed beef is fast passing away, and stall-fed beef is growing in demand. To assist in demonstrating that beef can be profitably fed in the State, will be one of the objects in future feeding experiments.

Some two hundred varieties of potatoes were grown in plats last year. Notes were taken and results published in bulletin No. 30.

We sent out over one thousand one-pound packages of seed potatoes last spring. In many cases the results obtained from the varieties were very flattering. As much as one hundred and fifty pounds of potatoes were grown from a single pound of seed. In this way farmers are enabled to reap great profit from the experiment station work, and at the same time assist us in determing the most valuable varieties.

Forty plats of grasses and clovers were put out last year, and nearly all have made a good stand. Results of this work will appear in future bulletins.

A few roots of the noted forage plant (*Lathyrus sylvestris*), were obtained of the experiment station of California in 1893. These roots have grown finely, showing that the plant is well adapted to our soil and climate. Seed was obtained last spring and we now have quite a large plat started. From results reached in other places, we are led to think that this plant will be a most valuable acquisition to the list of forage plants, for the drier portions of the State. It is said to succeed remarkably well in foreign countries, on hill land similar to that of Oregon.

Fertilizer tests are now in progress on wheat, potatoes, roots, and corn. There is a growing interest in the use of commercial fertilizers in the State; and we shall hope to be able to furnish some reliable data upon the practical application of these manures.

In our last report mention was made of clover tests upon white land. Where the land is well drained there is no difficulty in growing clover success-

fully. The yield of clover last year from a field containing twenty acres of partially white land was three and one half tons per acre. The growing of clover has ceased to be an experiment with us; it is a reality. Clover can be grown on all of the higher pastures of the Willamette Valley, without doubt, if the ground is placed in proper condition for the seed.

Eighty varieties of wheat were grown in plats last season. Samples of three varieties have been distributed among the farmers of the State for trial. From returns received these varieties promise to excel the old and somewhat run-out varieties. Two hundred packages of this wheat was sent out for trial.

The silos built in the new barn are very convenient and prove satisfactory in every particular.

Aside from planing and superintending the experiments briefly alluded to in this report, I have had a general supervision over the work of the college farm. I have attended and taken part in the programme of Farmers' Institutes held at Hillsboro and Oakland, the only institutes held during the year. Three and one half hours have been spent daily in the class room and college work.

WORK NOT YET PUBLISHED AND CONTEMPLATED WORK IN THIS DEPARTMENT.

1. Steer-feeding experiments in testing the value of corn silage and chopped wheat compared with hay and grain.
2. Pig-feeding on forage plants. (*a*) Winter vetch; (*b*) clover.
3. Plat experiments in testing grasses and clovers.
4. Testing forage plants. (*a*) Flat pea (*Lathysus sylvestris*); (*b*) rape; (*c*) Kaffin corn and Jerusalem corn; (*d*) crimson clover; (*e*) millet; (*f*) winter vetch.
5. Fertilizer tests. (*a*) Potatoes; (*b*) wheat; (*c*) corn.
6. Testing varieties. (*a*) Potatoes; (*b*) mangels; (*c*) carrots; (*d*) corn; (*e*) spring grains.

Finally, I wish to thank you, Mr. President and Director, for the cordial manner in which you have coöperated with me in furthering the interests of the agricultural deprrtment of the station and college.

CASH RECEIPTS OF FARM FROM JULY, 1893, TO JULY, 1894.

Produce.	Amount.
125 pounds butter @ 25c	$ 31 25
169 gallons milk @ 15c	25 40
5 bushels vetches @ $1.50	7 50
188 bushels wheat	78 70
15 bushels potatoes @ 35c	5 25
3¾ tons of hay	30 65
2 fat calves	16 50
368 bushels potatoes @ 25c	92 00
4,154 pounds beef @ 3¼c	135 00
550 pounds beef @ 2½c	13 75
1,004 pounds pork @ 6c	60 14
100 pounds hay @ 1c	1 00
1 bushel wheat	50
Sow and pigs	40 00
4 fat steers, on foot	100 00
Bull service	3 00
6 pigs, on foot	50 45
86 pounds wool @ 10c	8 60
1 pig	5 00
Silage cutter	20 00
Total cash received	$ 724 79
320 gallons milk to Mr. Moore @ 15c	543 00
Total	$ 1,267 79

Total products of the farm from July, 1893, to July, 1894:—135 pounds of butter, 3,939 gallons of milk, 570 bushels of potatoes, 14 tons 1,700 pounds of roots, 108 tons of corn silage, 224 bushels of oats, 128 bushels of wheat, 69 tons of hay.

Very respectfully,

H. T. FRENCH, Agriculturist.

From Professor George Coote, Horticulturist to the Station:—

President John M. Bloss, Director of Experiment Station—

DEAR SIR: In addition to the work already reported on, there was, during the past biennial term, a further trial of fall-planted cabbage, consisting of eight varieties, all of which were claimed to be early in maturing. Early Etapes proved to be the first to mature of the eight varieties tested, being five days in advance; Early Summer the second, Jersey Wakefield the third.

CELERY.—Tests were made with four varieties for the purpose of proving earliness, hardiness, and quality. For early use, Golden Yellow proved to be excellent; White Plume, second. Solid Ivory is well suited for late use, as it stands well through the winter months.

KALE.—Notes were kept on nine varieties, which proved to be of great value, supplying a great quantity of green vegetables late in spring. Varieties found best suited to this climate were as follows: Fall Scotch, Extra Early Curled, and Dwarf German.

BEANS.—Tests were made with eight varieties—three of which were Limas—of which none matured seeds. Early Golden Cluster proved to be of great value, being both handsome and productive.

TOMATOES.—Four varieties were received from different seedsmen for trial, namely: Thornburn's Terra-cotta, Lemon Blush, Atlantic Prize, and Early Michigan. Atlantic Prize proved to be valuable on account of its earliness; Terra-cotta being a good second early.

STRAWBERRIES.—Comparative notes were made on forty-eight varieties during the year. Report on each variety will be found in bulletin No. 29.

ORCHARD.—The varieties of fruit trees in the experimental orchard are doing well; a few have commenced to produce fruit. Owing to the late frost in the spring of 1894, the blooms were cut so badly that but few set. Prunes (*Simonii*) fruited last season, but did not prove of very great value. Keswick Codling apple also fruited, and proved to be highly productive, and valuable for cooking purposes. In the experimental orchard the following varieties of fruit are growing: Apples, 29; pears, 32; peaches, 11; crabs, 4; plums, 5; grapes, 32, making a total of 113 varieties growing in experimental orchard.

GRAPES.—Eight varieties have fruited so far. Green Mountain has given best results as a white grape, being very early to mature, and of good quality.

PEACHES.—The orchard planted in 1889 consisted of about forty varieties. Not one has proved to be of any value, being each year injured by curl-leaf so much that the greater number of them have died. Those remaining should be removed, and further experiment made in a different location. During the winter of 1894 experiments were made to prevent curl-leaf by spraying with the lime, sulphur, and salt mixture, and the result shows an improvement of 50 per cent over those not sprayed. In the month of November three varieties of the peach that had been badly affected for four years by curl-leaf were taken from the orchard, planted in half-barrels, placed in the cool greenhouse, and a correct record kept as to temperature, morning, noon, and night. Each tree has made good growth, without the least trace of curf-leaf. The trees were placed in the greenhouse in order more closely to study the cause of the disease. Report on this experiment will be given in a future bulletin.

During the early spring notes have been taken on all the varieties of pears, apples, cherries, and plums already set out, with a view of ascertaining those varieties that are the greatest pollen-producers, also the date of blooming and

date of fertilization, for the purpose of classifying each variety in regular order, so that a better understanding may be gained in methods of planting orchards. It is essential to know those varieties that are productive of pollen, those which bloom at the same time, and those which are sterile, in order that the pollen-producers may better fertilize those that are sterile.

HOPS. — In the spring of this year one acre was planted on the experimental grounds for the purpose of future experiments. The plants are making good growth, and promise well.

EXPERIMENTS NOW IN PROGRESS.

Comparative notes on, and the testing of a number of novelties in vegetables, in the order mentioned: cabbage, 8 varieties; cauliflower, 4; radish, 6; celery, 6; tomatoes, 3; lettus, 7; beets, 6; beans, 12; onion, 1; pease, 13; squash, 5; cucumber, 3; watermelon, 2; muskmelon, 2; spinach, 4; leek, 1; total 87 varieties. Cucumber experiment has been commenced in growing the cucumber in the small hothouse, for the purpose of determining whether or not by that method of cultivation they can be made profitable in Oregon, when grown under glass. The varities are of a much larger kind than the common pickling cucumber.

STRAWBERRIES. — Notes are being kept on several varieties. This is in continuance of the work already reported. New additions to the collection will be made during the year: also notes on a large number of small fruits, such as blackberries, gooseberries, currants, raspberries, and serviceberries.

Further experiments will be made with the different fungicides during the year for the prevention of curl-leaf on the peach. Experiments in cross-fertilization will be made. For this purpose I have several varieties of fruit trees planted in boxes so that they may be placed in the greenhouse, where the work may be carried on with better success, as it is impossible to carry on the work outside at the season of the year when heavy rains and late frosts interfere.

HOPS. — Experiment will be made with several fertilizers, and the different methods of cultivation and training of the plant.

PRODUCTS SOLD FROM SEPTEMBER, 1893, TO JUNE, 1894.

Cash received for produce during the year and paid over is as follows: —

October 31, 1893	$ 63 25
November 20, 1893	26 80
December 11, 1893	20 00
January 19, 1894	24 00
Total	$ 114 05

GEORGE COOTE, Horticulturist.

From Professor F. L. Washburn, Entomologist to the Station: —

President John M. Bloss, Director of Experiment Station —

DEAR SIR: At your request I hand you herewith a report of work for the past two years in the entomological department of the station.

INSTITUTES ATTENDED. — Six Farmers' Institutes have been attended by the entomologist where papers on insect pests have been presented. Communications have also been sent to the press at various times during the year.

WORLD'S FAIR EXHIBIT. — The department exhibited at Chicago a spraying outfit belonging to the station, with large photo illustrating its use in orchards, a glass breeding cage used by the department, and three cases of mounted Oregon insects. All this property has been safely returned and the three cases of insects now form a feature of the zoölogical museum.

CORRESPONDENCE. — About two hundred and fifty letters of inquiry regarding insect pests have been answered.

WORK PROPOSED.—1. Combined experiments by the botanist and entomologist to demonstrate the value of a combined fungicide and insecticide, directed against the apple scab and insects affecting the apple and the pear.

2. Experiments against various forms of plant lice, including the hop-louse.

3. Experiment to test the value of kainit and muriate of potash (when broad-casted) against cutworms and wireworms.

4. Experiment with Koebele's Resin Wash, to see whether it may be used weak enough to be harmless to beneficial insects, while at the same time it will kill the tender-bodied plant lice amongst which the beneficial insects are found.

5. A known number of "weevily" pease (700) have been planted to determine what proportion of seed thus injured will germinate. The formed pods on those which will come up will be sprayed with some repellant to keep, if possible, the beetle from laying eggs thereon.

6. If possible it would be advisable to keep at the station a flock of capons with roosters as checks. In this way the results of caponizing would be more easily seen and demonstrated than when a few birds, which are private property, are used.

7. The entomologist holds himself ready at all times to impart to farmers and orchardists all information possible lying within his province and to unite with them in quelling any unlooked for uprising of insect pests.

Respectfully,

F. L. WASHBURN, Entomologist.

From Professor Moses Craig, Botanist to the Station:—

President John M. Bloss, Director Experiment Station—

DEAR SIR: I herewith submit the following report: The constant endeavor has been to build up the department and increase its efficiency. Careful records have been kept of work accomplished, as well as work in progress. Two bulletins have been published, No. 19, on "Some Oregon Weeds and How to Destroy Them," and No. 27, on "The Cause and Prevention of Plant Diseases."

A large number of letters asking information about medicinal, weedy and poisonous plants, plants best adapted to certain locations, various grasses, the cause, prevention and cure of various plant diseases, etc., have been received and answered. These have been carefully filed, together with copies of answers returned.

As all botanists know, much of the work done in improving an herbarium is seen only on close inspection. Our herbarium has been built up both by collections and exchange, the old cases extended, 100 new shelves added, and the entire collection rearranged and labeled according to recent botanical nomenclature. It is now the best college collection in the State. Number of species in herbarium, 5,013; phanerogams, 2,659; cryptogams, 2,354; new plants added to herbarium, 1,790; plants identified for farmers, 260.

During the summer vacation I have collected a large number of specimens, with many duplicates for exchange with other botanists. For example, a large number of weedy plants was sent to Professor Halsted, and many grasses to Professor Tracy. A large number of specimens received in exchange remain unmounted for lack of paper. Imperfect specimens have been improved and many doubtful determinations have been changed or verified. Specimens of the most injurious and obnoxious weeds, the characteristic grasses, economic fungi, and some typical plants of the State were collected and sent to the committees appointed by the Association of Experiment Stations for the Columbian Exposition.

The following is the outline of work proposed in this department:—

1. To continue the work begun in bulletin No. 19, on the weedy and poisonous plants of the State.

2. To continue the work on plant diseases begun in bulletin No. 27.

I am now carrying on, in connection with the entomologist, a series of experiments in the station orchard, on the effect of a combined fungicide and insecticide.

3. To make a study of the clovers, grasses, and forage plants of the State in coöperation with the chemist. This work was begun last year but from unforseen causes much will have to be done over again. The native clovers will be taken up first, as they present a fine field for original investigation.

4. A study of forest conditions; first, with the view of preventing the great waste of timber from forest fires; and, second, to introduce tree culture in the eastern part of the State.

5. To make a collection for the herbarium of as many specimens of Oregon plants as possible and by exchange to increase the working collection from other States.

6. To collect as many species and forms of parasitic fungi as possible, preparatory to cataloguing the rusts and mildews of the State. A large quantity of specimens have already been collected.

The above work will require a number of years for its completion, and other lines may be taken up simultaneously with these as occasion requires.

Respectsully submitted.

MOSES CRAIG, Botanist.

From Mr. John Fulton, Acting Chemist to the Experiment Station: —

President John M. Bloss, Director of Experiment Station —

DEAR SIR: I have the honor to submit the following report on the work done in the chemical laboratory of the experiment station since January 12, 1892:

Prior to the change of officers of this department a synopsis of the lines of investigation was laid out by Prof. G. W. Shaw, the officer then in charge, embodying the following experiments —

(*a*) Extended investigation concerning the chemistry and physics of alkali soils.

(*b*) The best methods of improving these soils.

(*c*) Experiments to determine the chemical valuation of the various cattle foods of the State.

(*d*) A thorough chemical study of the grasses and clovers of the State.

Carrying the soil experiments as far as possible with the material on hand, Professor Lotz — successor to Professor Shaw — with my assistance, entered upon the determination of carbon hydrates in different grasses, results of which are to be issued in bulletin form after an extended series of experiments have been made.

Another line of work — not before contemplated — was the analysis of commercial fertilizers; but as the law does not provide for the exposition of analysis, except of those samples which are sent by the food commissioners, we are not authorized to make publication of the work.

During the and fall summer of 1893 a collection of the native clovers was made with a view to determine their food value with cultivated clovers. Results of these experiments will also be published in bulletin form.

Towards the close of last summer Professor Lotz suggested the idea of determining the amount of the different ingredients taken from the soil by different varieties of pears, apples, and prunes, and accordingly sent out about seventy-five letters requesting the recipient to forward several samples of fruit, together with the soil upon which they were raised, for the purpose of investigation in this line. The importance of these determinations was not apparant to many orchardists, as only few complied with his request.

From different portions of the State, and from some adjoining States, many

samples of ores and water have been sent for analysis, all of which have been completed, and are to be found under the head of miscellaneous work.

Below, in tabulated form, the number of analysis made for the food commissioner is given: —

	Number of analyses made.	Estimated cost of analyses.
Analyses of milk	24	$ 120 00
Analyses of butter	2	16 00
Analyses of fat	2	20 00
Analyses of cheese	4	60 00
Analyses of coffee	3	30 00
Analyses of tea	2	20 00
Analyses of flour	2	30 00
Analyses of mustard	2	20 00
Analysis of pepper	1	10 00
Analysis of buckwheat	1	15 00
Analyses of lard	2	30 00
Total for food commissioner	45	$ 371 00

In miscellaneous work, the following has been done: —

	Number of analyses made.	Estimated cost of analyses.
Analyses of clay	2	$ 20 00
Analyses of condensed milk	4	48 00
Analyses of green pease	4	60 00
Analysis of honey	1	30 00
Analyses of syrup	2	60 00
Analyses of bread	2	40 00
Analyses of mineral water (qual.)	6	60 00
Analyses of ores	3	15 00
Analyses of butter	6	60 00
Analyses of coal	4	80 00
Total miscellaneous work	34	$ 473 00

For which the department has received no remuneration, with the exception of one case.

In the line of laboratory work, the following analyses has been made: Analyses of feeding stuffs, 7; analyses of slag for fertilizer, 2; analyses of fruit, 5; analyses of ashes, 8; analyses of soils, 18; analyses of fertilizers, 13; analysis of kelp, 1; analyses of beets, 4; total, 58. Total number of analyses made from January, 1893, to June 15, 1894, is 137.

Regarding the intended lines of work for investigation I beg leave to state that it is the purpose and intention of this department —

(*a*) To conduct an extended series of experiments to determine the effect of certain fertilizers upon different field and garden products.

(*b*) To extend the work in analyses of fruits and the soils upon which they grew.

(*c*) To continue experiments to determine the food value of the native grasses and clovers, and also of the cultivated varieties.

Considering the amount of miscellaneous work continually received at the laboratory, added to the regular line of work, we have ample employment for nearly all the ensuing year.

Respectfully yours,

JOHN FULTON, Acting Chemist.

From Professor E. F. Pernot, Photographer to the Station:—

President John M. Bloss, Director of Experiment Station—

DEAR SIR: I herewith submit the following report of work completed by the department of photography and engraving since the report of 1893.

During the past year new and commodious apartments have been provided for the efficient execution of this work. Though they are but partially equipped, they have been the realization of a long-felt necessity.

TEACHING THE ART AND SCIENCE OF PHOTOGRAPHY.— In the college, photography is taught as an elective study to those who are in the third and fourth year's work. Two classes have been taught this science, one primary and one advanced, the latter having received a general practical knowledge of the art. One student, a post-graduate, has taken a nine months, special course in the art of newspaper illustration.

ENGRAVING.— The following engravings have been made within the past two years for illustrating the several bulletins issued by the station, also the college catalogue and other illustrations which were deemed necessary. Total number of engravings, 70, representing a commercial value of $385. The demand for illustrations in the bulletins is increasing, and these illustrations are indispensable features for the college and station. The greater portion of these engravings are half-tone photogravings from photographs of the experiments made, and the remaining portion are line-engravings from pen and ink drawings.

PHOTOGRAPHS.— Photographs were taken of all the important experiments, and methods of treating plant diseases, thus giving a correct record of the experiments. Lantern slides were made from photographs necessary to illustrate lectures at the Farmers' Institutes, giving the public a more comprehensive idea of the statements made. In connection with this, lantern slides have been made of all the college buildings and accessories, thus giving the public a broader knowledge of the work the institution is doing.

PHOTO-MICOGRAPHY.— This is by no means an unimportant branch of the work done in this department. In revealing the adulterations of foods sent to the experiment station, the photo-micrograph is an important factor, as it gives a true reproduction of the sample. The micrograph is one of the means by which the development of plant diseases may be studied under different conditions, and the destructive work of insects carefully reproduced for reference. This very important work should be thoroughly considered, and, as far as possible, the necessary appliances should be provided for the proper execution of the work.

Respectfully submitted.

E. F. PERNOT, Photographer.